



## SEQUENCE LISTING

<110> IUCHI, SATOSHI  
KOBAYASHI, MASATOMO  
SHINOZAKI, KAZUO

<120> TRANSGENIC PLANTS CARRYING NEOXANTHIN  
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ccg	gtg	aat	gaa	cag	ccc	gtc	cgg	cgt	aat	ctt	ccg	gtg	gtc	gga	aaa	432
Pro	Val	Asn	Glu	Gln	Pro	Val	Arg	Arg	Asn	Leu	Pro	Val	Val	Gly	Lys	
	130					135					140					
ctt	ccc	gat	tcc	atc	aaa	gga	gtg	tat	gtg	cgc	aac	gga	gct	aac	cca	480
Leu	Pro	Asp	Ser	Ile	Lys	Gly	Val	Tyr	Val	Arg	Asn	Gly	Ala	Asn	Pro	
	145				150					155					160	
ctt	cac	gag	ccg	gtg	aca	ggg	cac	cac	ttc	ttc	gac	gga	gac	ggg	atg	528
Leu	His	Glu	Pro	Val	Thr	Gly	His	His	Phe	Phe	Asp	Gly	Asp	Gly	Met	
				165					170					175		
gtt	cac	gcc	gtc	aaa	ttc	gaa	cac	ggg	tca	gct	agc	tac	gct	tgc	cgg	576
Val	His	Ala	Val	Lys	Phe	Glu	His	Gly	Ser	Ala	Ser	Tyr	Ala	Cys	Arg	
			180					185					190			
ttt	act	cag	act	aac	cgg	ttt	gtt	cag	gaa	cgt	caa	ttg	ggg	cga	ccg	624
Phe	Thr	Gln	Thr	Asn	Arg	Phe	Val	Gln	Glu	Arg	Gln	Leu	Gly	Arg	Pro	
		195					200					205				
gtt	ttc	ccc	aaa	gcc	atc	ggg	gag	ctt	cac	ggc	cac	acc	ggg	att	gcc	672
Val	Phe	Pro	Lys	Ala	Ile	Gly	Glu	Leu	His	Gly	His	Thr	Gly	Ile	Ala	
	210					215					220					
cga	ctc	atg	cta	ttc	tac	gcc	aga	gct	gca	gcc	ggg	ata	gtc	gac	ccg	720
Arg	Leu	Met	Leu	Phe	Tyr	Ala	Arg	Ala	Ala	Ala	Gly	Ile	Val	Asp	Pro	
	225				230				235						240	
gca	cac	gga	acc	ggg	gta	gct	aac	gcc	ggg	ttg	gtc	tat	ttc	aat	ggc	768
Ala	His	Gly	Thr	Gly	Val	Ala	Asn	Ala	Gly	Leu	Val	Tyr	Phe	Asn	Gly	
				245				250						255		
cgg	tta	ttg	gct	atg	tgc	gag	gat	gat	tta	cct	tac	caa	gtt	cag	atc	816
Arg	Leu	Leu	Ala	Met	Ser	Glu	Asp	Asp	Leu	Pro	Tyr	Gln	Val	Gln	Ile	
			260				265						270			
act	ccc	aat	gga	gat	tta	aaa	acc	gtt	ggg	cgg	ttc	gat	ttt	gat	gga	864
Thr	Pro	Asn	Gly	Asp	Leu	Lys	Thr	Val	Gly	Arg	Phe	Asp	Phe	Asp	Gly	
		275					280					285				
caa	tta	gaa	tcc	aca	atg	att	gcc	cac	ccg	aaa	gtc	gac	ccg	gaa	tcc	912
Gln	Leu	Glu	Ser	Thr	Met	Ile	Ala	His	Pro	Lys	Val	Asp	Pro	Glu	Ser	
	290					295					300					
ggg	gaa	ctc	ttc	gct	tta	agc	tac	gac	gtc	gtt	tca	aag	cct	tac	cta	960
Gly	Glu	Leu	Phe	Ala	Leu	Ser	Tyr	Asp	Val	Val	Ser	Lys	Pro	Tyr	Leu	
	305				310				315						320	
aaa	tac	ttc	cga	ttc	tca	ccg	gac	gga	act	aaa	tca	ccg	gac	gtc	gag	1008
Lys	Tyr	Phe	Arg	Phe	Ser	Pro	Asp	Gly	Thr	Lys	Ser	Pro	Asp	Val	Glu	
				325				330						335		
att	cag	ctt	gat	cag	cca	acg	atg	atg	cac	gat	ttc	gcg	att	aca	gag	1056
Ile	Gln	Leu	Asp	Gln	Pro	Thr	Met	Met	His	Asp	Phe	Ala	Ile	Thr	Glu	
		340					345						350			

aac ttc gtc gtc gta cct gac cag caa gtc gtt ttc aag ctg ccg gag	1104
Asn Phe Val Val Val Pro Asp Gln Gln Val Val Phe Lys Leu Pro Glu	
355 360 365	
atg atc cgc ggt ggg tct ccg gtg gtt tac gac aag aac aag gtc gca	1152
Met Ile Arg Gly Gly Ser Pro Val Val Tyr Asp Lys Asn Lys Val Ala	
370 375 380	
aga ttc ggg att tta gac aaa tac gcc gaa gat tca tcg aac att aag	1200
Arg Phe Gly Ile Leu Asp Lys Tyr Ala Glu Asp Ser Ser Asn Ile Lys	
385 390 395 400	
tgg att gat gct cca gat tgc ttc tgc ttc cat ctc tgg aac gct tgg	1248
Trp Ile Asp Ala Pro Asp Cys Phe Cys Phe His Leu Trp Asn Ala Trp	
405 410 415	
gaa gag cca gaa aca gat gaa gtc gtc gtg ata ggg tcc tgt atg act	1296
Glu Glu Pro Glu Thr Asp Glu Val Val Val Ile Gly Ser Cys Met Thr	
420 425 430	
cca cca gac tca att ttc aac gag tct gac gag aat ctc aag agt gtc	1344
Pro Pro Asp Ser Ile Phe Asn Glu Ser Asp Glu Asn Leu Lys Ser Val	
435 440 445	
ctg tct gaa atc cgc ctg aat ctc aaa acc ggt gaa tca act cgc cgt	1392
Leu Ser Glu Ile Arg Leu Asn Leu Lys Thr Gly Glu Ser Thr Arg Arg	
450 455 460	
ccg atc atc tcc aac gaa gat caa caa gtc aac ctc gaa gca ggg atg	1440
Pro Ile Ile Ser Asn Glu Asp Gln Gln Val Asn Leu Glu Ala Gly Met	
465 470 475 480	
gtc aac aga aac atg ctc ggc cgt aaa acc aaa ttc gct tac ttg gct	1488
Val Asn Arg Asn Met Leu Gly Arg Lys Thr Lys Phe Ala Tyr Leu Ala	
485 490 495	
tta gcc gag ccg tgg cct aaa gtc tca gga ttc gct aaa gtt gat ctc	1536
Leu Ala Glu Pro Trp Pro Lys Val Ser Gly Phe Ala Lys Val Asp Leu	
500 505 510	
act act gga gaa gtt aag aaa cat ctt tac ggc gat aac cgt tac gga	1584
Thr Thr Gly Glu Val Lys Lys His Leu Tyr Gly Asp Asn Arg Tyr Gly	
515 520 525	
gga gag cct ctg ttt ctc ccc gga gaa gga gga gag gaa gac gaa gga	1632
Gly Glu Pro Leu Phe Leu Pro Gly Glu Gly Gly Glu Glu Asp Glu Gly	
530 535 540	
tac atc ctc tgt ttc gtt cac gac gag aag aca tgg aaa tcg gag tta	1680
Tyr Ile Leu Cys Phe Val His Asp Glu Lys Thr Trp Lys Ser Glu Leu	
545 550 555 560	
cag ata gtt aac gcc gtt agc tta gag gtt gaa gca acg gtt aaa ctt	1728
Gln Ile Val Asn Ala Val Ser Leu Glu Val Glu Ala Thr Val Lys Leu	
565 570 575	

102299 "62299" 62299 250

gat ttg gcg aag cag gtc gtg tga 1800  
Asp Leu Ala Lys Gln Val Val  
595

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Met	Ala	Ser	Phe	Thr	Ala	Thr	Ala	Ala	Val	Ser	Gly	Arg	Trp	Leu	Gly
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Gly	Asn	His	Thr	Gln	Pro	Pro	Leu	Ser	Ser	Ser	Gln	Ser	Ser	Asp	Leu
			20					25					30		
Ser	Tyr	Cys	Ser	Ser	Leu	Pro	Met	Ala	Ser	Arg	Val	Thr	Arg	Lys	Leu
		35					40					45			
Asn	Val	Ser	Ser	Ala	Leu	His	Thr	Pro	Pro	Ala	Leu	His	Phe	Pro	Lys
	50					55					60				
Gln	Ser	Ser	Asn	Ser	Pro	Ala	Ile	Val	Val	Lys	Pro	Lys	Ala	Lys	Glu
65					70					75					80
Ser	Asn	Thr	Lys	Gln	Met	Asn	Leu	Phe	Gln	Arg	Ala	Ala	Ala	Ala	Ala
				85					90					95	
Leu	Asp	Ala	Ala	Glu	Gly	Phe	Leu	Val	Ser	His	Glu	Lys	Leu	His	Pro
			100					105					110		
Leu	Pro	Lys	Thr	Ala	Asp	Pro	Ser	Val	Gln	Ile	Ala	Gly	Asn	Phe	Ala
		115					120					125			
Pro	Val	Asn	Glu	Gln	Pro	Val	Arg	Arg	Asn	Leu	Pro	Val	Val	Gly	Lys
		130				135					140				
Leu	Pro	Asp	Ser	Ile	Lys	Gly	Val	Tyr	Val	Arg	Asn	Gly	Ala	Asn	Pro
145					150					155					160
Leu	His	Glu	Pro	Val	Thr	Gly	His	His	Phe	Phe	Asp	Gly	Asp	Gly	Met
				165					170					175	
Val	His	Ala	Val	Lys	Phe	Glu	His	Gly	Ser	Ala	Ser	Tyr	Ala	Cys	Arg
			180					185					190		
Phe	Thr	Gln	Thr	Asn	Arg	Phe	Val	Gln	Glu	Arg	Gln	Leu	Gly	Arg	Pro
		195					200					205			
Val	Phe	Pro	Lys	Ala	Ile	Gly	Glu	Leu	His	Gly	His	Thr	Gly	Ile	Ala
					215						220				

Arg Leu Met Leu Phe Tyr Ala Arg Ala Ala Ala Gly Ile Val Asp Pro  
 225 230 235 240  
 Ala His Gly Thr Gly Val Ala Asn Ala Gly Leu Val Tyr Phe Asn Gly  
 245 250 255  
 Arg Leu Leu Ala Met Ser Glu Asp Asp Leu Pro Tyr Gln Val Gln Ile  
 260 265 270  
 Thr Pro Asn Gly Asp Leu Lys Thr Val Gly Arg Phe Asp Phe Asp Gly  
 275 280 285  
 Gln Leu Glu Ser Thr Met Ile Ala His Pro Lys Val Asp Pro Glu Ser  
 290 295 300  
 Gly Glu Leu Phe Ala Leu Ser Tyr Asp Val Val Ser Lys Pro Tyr Leu  
 305 310 315 320  
 Lys Tyr Phe Arg Phe Ser Pro Asp Gly Thr Lys Ser Pro Asp Val Glu  
 325 330 335  
 Ile Gln Leu Asp Gln Pro Thr Met Met His Asp Phe Ala Ile Thr Glu  
 340 345 350  
 Asn Phe Val Val Val Pro Asp Gln Gln Val Val Phe Lys Leu Pro Glu  
 355 360 365  
 Met Ile Arg Gly Gly Ser Pro Val Val Tyr Asp Lys Asn Lys Val Ala  
 370 375 380  
 Arg Phe Gly Ile Leu Asp Lys Tyr Ala Glu Asp Ser Ser Asn Ile Lys  
 385 390 395 400  
 Trp Ile Asp Ala Pro Asp Cys Phe Cys Phe His Leu Trp Asn Ala Trp  
 405 410 415  
 Glu Glu Pro Glu Thr Asp Glu Val Val Val Ile Gly Ser Cys Met Thr  
 420 425 430  
 Pro Pro Asp Ser Ile Phe Asn Glu Ser Asp Glu Asn Leu Lys Ser Val  
 435 440 445  
 Leu Ser Glu Ile Arg Leu Asn Leu Lys Thr Gly Glu Ser Thr Arg Arg  
 450 455 460  
 Pro Ile Ile Ser Asn Glu Asp Gln Gln Val Asn Leu Glu Ala Gly Met  
 465 470 475 480  
 Val Asn Arg Asn Met Leu Gly Arg Lys Thr Lys Phe Ala Tyr Leu Ala  
 485 490 495  
 Leu Ala Glu Pro Trp Pro Lys Val Ser Gly Phe Ala Lys Val Asp Leu  
 500 505 510  
 Thr Thr Gly Glu Val Lys Lys His Leu Tyr Gly Asp Asn Arg Tyr Gly  
 515 520 525

Gly Glu Pro Leu Phe Leu Pro Gly Glu Gly Gly Glu Glu Asp Glu Gly  
 530 535 540

Tyr Ile Leu Cys Phe Val His Asp Glu Lys Thr Trp Lys Ser Glu Leu  
 545 550 555 560

Gln Ile Val Asn Ala Val Ser Leu Glu Val Glu Ala Thr Val Lys Leu  
 565 570 575

Pro Ser Arg Val Pro Tyr Gly Phe His Gly Thr Phe Ile Gly Ala Asp  
 580 585 590

Asp Leu Ala Lys Gln Val Val  
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&lt;210&gt; 7

&lt;211&gt; 1617

&lt;212&gt; DNA

&lt;213&gt; Arabidopsis thaliana

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (1) .. (1614)

&lt;400&gt; 7

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 Met Ala Glu Lys Leu Ser Asp Gly Ser Ser Ile Ile Ser Val His Pro  
 1 5 10 15

aga ccc tcc aag ggt ttc tcc tcg aag ctt ctc gat ctt ctc gag aga 96  
 Arg Pro Ser Lys Gly Phe Ser Ser Lys Leu Leu Asp Leu Leu Glu Arg  
 20 25 30

ctt gtt gtc aag ctc atg cac gat gct tct ctc cct ctc cac tac ctc 144  
 Leu Val Val Lys Leu Met His Asp Ala Ser Leu Pro Leu His Tyr Leu  
 35 40 45

tca ggc aac ttc gct ccc atc cgt gat gaa act cct ccc gtc aag gat 192  
 Ser Gly Asn Phe Ala Pro Ile Arg Asp Glu Thr Pro Pro Val Lys Asp  
 50 55 60

ctc ccc gtc cat gga ttt ctt ccc gaa tgc ttg aat ggt gaa ttt gtg 240  
 Leu Pro Val His Gly Phe Leu Pro Glu Cys Leu Asn Gly Glu Phe Val  
 65 70 75 80

agg gtt ggt cca aac ccc aag ttt gat gct gtc gct gga tat cac tgg 288  
 Arg Val Gly Pro Asn Pro Lys Phe Asp Ala Val Ala Gly Tyr His Trp  
 85 90 95

ttt gat gga gat ggg atg att cat ggg gta cgc atc aaa gat ggg aaa 336  
 Phe Asp Gly Asp Gly Met Ile His Gly Val Arg Ile Lys Asp Gly Lys  
 100 105 110

gct act tat gtt tct cga tat gtt aag aca tca cgt ctt aag cag gaa 384  
 Ala Thr Tyr Val Ser Arg Tyr Val Lys Thr Ser Arg Leu Lys Gln Glu  
 115 120 125

T04200"60205269



gag	ttc	ttc	gga	gct	gcc	aaa	ttc	atg	aag	att	ggt	gac	ctt	aag	ggg	432
Glu	Phe	Phe	Gly	Ala	Ala	Lys	Phe	Met	Lys	Ile	Gly	Asp	Leu	Lys	Gly	
130						135					140					
ttt	ttc	gga	ttg	cta	atg	gtc	aat	gtc	caa	cag	ctg	aga	acg	aag	ctc	480
Phe	Phe	Gly	Leu	Leu	Met	Val	Asn	Val	Gln	Gln	Leu	Arg	Thr	Lys	Leu	
145					150					155					160	
aaa	ata	ttg	gac	aac	act	tat	gga	aat	gga	act	gcc	aat	aca	gca	ctc	528
Lys	Ile	Leu	Asp	Asn	Thr	Tyr	Gly	Asn	Gly	Thr	Ala	Asn	Thr	Ala	Leu	
				165					170					175		
gta	tat	cac	cat	gga	aaa	ctt	cta	gca	tta	cag	gag	gca	gat	aag	ccg	576
Val	Tyr	His	His	Gly	Lys	Leu	Leu	Ala	Leu	Gln	Glu	Ala	Asp	Lys	Pro	
			180					185					190			
tac	gtc	atc	aaa	gtt	ttg	gaa	gat	gga	gac	ctg	caa	act	ctt	ggg	ata	624
Tyr	Val	Ile	Lys	Val	Leu	Glu	Asp	Gly	Asp	Leu	Gln	Thr	Leu	Gly	Ile	
		195					200					205				
ata	gat	tat	gac	aag	aga	ttg	acc	cac	tcc	ttc	act	gct	cac	cca	aaa	672
Ile	Asp	Tyr	Asp	Lys	Arg	Leu	Thr	His	Ser	Phe	Thr	Ala	His	Pro	Lys	
	210					215					220					
gtt	gac	ccg	gtt	acg	ggg	gaa	atg	ttt	aca	ttc	ggc	tat	tcg	cat	acg	720
Val	Asp	Pro	Val	Thr	Gly	Glu	Met	Phe	Thr	Phe	Gly	Tyr	Ser	His	Thr	
225					230					235					240	
cca	cct	tat	ctc	aca	tac	aga	gtt	atc	tcg	aaa	gat	ggc	att	atg	cat	768
Pro	Pro	Tyr	Leu	Thr	Tyr	Arg	Val	Ile	Ser	Lys	Asp	Gly	Ile	Met	His	
			245						250					255		
gac	cca	gtc	cca	att	act	ata	tca	gag	cct	atc	atg	atg	cat	gat	ttt	816
Asp	Pro	Val	Pro	Ile	Thr	Ile	Ser	Glu	Pro	Ile	Met	Met	His	Asp	Phe	
			260					265					270			
gct	att	act	gag	act	tat	gca	atc	ttc	atg	gat	ctt	cct	atg	cac	ttc	864
Ala	Ile	Thr	Glu	Thr	Tyr	Ala	Ile	Phe	Met	Asp	Leu	Pro	Met	His	Phe	
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Arg	Pro	Lys	Glu	Met	Val	Lys	Glu	Lys	Lys	Met	Ile	Tyr	Ser	Phe	Asp	
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Pro	Thr	Lys	Lys	Ala	Arg	Phe	Gly	Val	Leu	Pro	Arg	Tyr	Ala	Lys	Asp	
305					310					315					320	
gaa	ctt	atg	att	aga	tgg	ttt	gag	ctt	ccc	aac	tgc	ttt	att	ttc	cac	1008
Glu	Leu	Met	Ile	Arg	Trp	Phe	Glu	Leu	Pro	Asn	Cys	Phe	Ile	Phe	His	
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aac	gcc	aat	gct	tgg	gaa	gaa	gag	gat	gaa	gtc	gtc	ctc	atc	act	tgt	1056
Asn	Ala	Asn	Ala	Trp	Glu	Glu	Glu	Asp	Glu	Val	Val	Leu	Ile	Thr	Cys	
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054339.062760

Met Ala Glu Lys Leu Ser Asp Gly Ser Ser Ile Ile Ser Val His Pro  
1 5 10 15

Arg	Pro	Ser	Lys 20	Gly	Phe	Ser	Ser	Lys 25	Leu	Leu	Asp	Leu	Leu 30	Glu	Arg
Leu	Val	Val 35	Lys	Leu	Met	His	Asp 40	Ala	Ser	Leu	Pro	Leu 45	His	Tyr	Leu
Ser	Gly 50	Asn	Phe	Ala	Pro	Ile 55	Arg	Asp	Glu	Thr	Pro 60	Pro	Val	Lys	Asp
Leu 65	Pro	Val	His	Gly	Phe 70	Leu	Pro	Glu	Cys	Leu 75	Asn	Gly	Glu	Phe	Val 80
Arg	Val	Gly	Pro	Asn 85	Pro	Lys	Phe	Asp	Ala 90	Val	Ala	Gly	Tyr	His 95	Trp
Phe	Asp	Gly 100	Asp	Gly	Met	Ile	His	Gly 105	Val	Arg	Ile	Lys	Asp 110	Gly	Lys
Ala	Thr	Tyr 115	Val	Ser	Arg	Tyr	Val 120	Lys	Thr	Ser	Arg	Leu 125	Lys	Gln	Glu
Glu 130	Phe	Phe	Gly	Ala	Ala	Lys 135	Phe	Met	Lys	Ile 140	Gly	Asp	Leu	Lys	Gly
Phe 145	Phe	Gly	Leu	Leu	Met 150	Val	Asn	Val	Gln 155	Gln	Leu	Arg	Thr	Lys	Leu 160
Lys	Ile	Leu	Asp	Asn 165	Thr	Tyr	Gly	Asn	Gly 170	Thr	Ala	Asn	Thr	Ala 175	Leu
Val	Tyr	His 180	His	Gly	Lys	Leu	Leu 185	Ala	Leu	Gln	Glu	Ala 190	Asp	Lys	Pro
Tyr	Val	Ile 195	Lys	Val	Leu	Glu	Asp 200	Gly	Asp	Leu	Gln	Thr 205	Leu	Gly	Ile
Ile 210	Asp	Tyr	Asp	Lys	Arg	Leu 215	Thr	His	Ser	Phe	Thr 220	Ala	His	Pro	Lys
Val 225	Asp	Pro	Val	Thr	Gly 230	Glu	Met	Phe	Thr	Phe 235	Gly	Tyr	Ser	His	Thr 240
Pro	Pro	Tyr	Leu	Thr 245	Tyr	Arg	Val	Ile	Ser 250	Lys	Asp	Gly	Ile	Met 255	His
Asp	Pro	Val 260	Pro	Ile	Thr	Ile	Ser	Glu 265	Pro	Ile	Met	Met	His 270	Asp	Phe
Ala	Ile 275	Thr	Glu	Thr	Tyr	Ala	Ile 280	Phe	Met	Asp	Leu	Pro 285	Met	His	Phe
Arg 290	Pro	Lys	Glu	Met	Val	Lys 295	Glu	Lys	Lys	Met	Ile 300	Tyr	Ser	Phe	Asp
Pro 305	Thr	Lys	Lys	Ala	Arg 310	Phe	Gly	Val	Leu 315	Pro	Arg	Tyr	Ala	Lys	Asp 320

Glu Leu Met Ile Arg Trp Phe Glu Leu Pro Asn Cys Phe Ile Phe His  
 325 330 335  
 Asn Ala Asn Ala Trp Glu Glu Glu Asp Glu Val Val Leu Ile Thr Cys  
 340 345 350  
 Arg Leu Glu Asn Pro Asp Leu Asp Met Val Ser Gly Lys Val Lys Glu  
 355 360 365  
 Lys Leu Glu Asn Phe Gly Asn Glu Leu Tyr Glu Met Arg Phe Asn Met  
 370 375 380  
 Lys Thr Gly Ser Ala Ser Gln Lys Lys Leu Ser Ala Ser Ala Val Asp  
 385 390 395 400  
 Phe Pro Arg Ile Asn Glu Cys Tyr Thr Gly Lys Lys Gln Arg Tyr Val  
 405 410 415  
 Tyr Gly Thr Ile Leu Asp Ser Ile Ala Lys Val Thr Gly Ile Ile Lys  
 420 425 430  
 Phe Asp Leu His Ala Glu Ala Glu Thr Gly Lys Arg Met Leu Glu Val  
 435 440 445  
 Gly Gly Asn Ile Lys Gly Ile Tyr Asp Leu Gly Glu Gly Arg Tyr Gly  
 450 455 460  
 Ser Glu Ala Ile Tyr Val Pro Arg Glu Thr Ala Glu Glu Asp Asp Gly  
 465 470 475 480  
 Tyr Leu Ile Phe Phe Val His Asp Glu Asn Thr Gly Lys Ser Cys Val  
 485 490 495  
 Thr Val Ile Asp Ala Lys Thr Met Ser Ala Glu Pro Val Ala Val Val  
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 530 535

&lt;210&gt; 9

&lt;211&gt; 1734

&lt;212&gt; DNA

&lt;213&gt; Arabidopsis thaliana

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (1)..(1731)

&lt;400&gt; 9

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Arg Ser His Leu Leu Pro Gln Pro Lys Asn Ala Asn Ile Ser Arg Arg	
20 25 30	
att ctc att aac cct ttc aag ata ccg aca ctt cct gat ctc act tct	144
Ile Leu Ile Asn Pro Phe Lys Ile Pro Thr Leu Pro Asp Leu Thr Ser	
35 40 45	
ccg gtt ccg tca ccg gtt aag ctc aaa cca acg tat cca aac tta aac	192
Pro Val Pro Ser Pro Val Lys Leu Lys Pro Thr Tyr Pro Asn Leu Asn	
50 55 60	
ctt ctt cag aag cta gcg gct acg atg ctc gac aag att gag tcc tct	240
Leu Leu Gln Lys Leu Ala Ala Thr Met Leu Asp Lys Ile Glu Ser Ser	
65 70 75 80	
atc gtt att cct atg gag cag aat cgc ccg ctt cct aaa ccg acc gac	288
Ile Val Ile Pro Met Glu Gln Asn Arg Pro Leu Pro Lys Pro Thr Asp	
85 90 95	
ccg gcg gtt caa tta tca ggt aac ttc gct ccg gtt aat gaa tgt ccg	336
Pro Ala Val Gln Leu Ser Gly Asn Phe Ala Pro Val Asn Glu Cys Pro	
100 105 110	
gtt cag aac ggt tta gaa gtg gtt ggt cag att cct tct tgt cta aaa	384
Val Gln Asn Gly Leu Glu Val Val Gly Gln Ile Pro Ser Cys Leu Lys	
115 120 125	
gga gtt tac atc cgt aac ggt gca aac cct atg ttt ccg ccg tta gcc	432
Gly Val Tyr Ile Arg Asn Gly Ala Asn Pro Met Phe Pro Pro Leu Ala	
130 135 140	
gga cat cat tta ttt gac ggt gac gga atg att cac gcc gtt agt atc	480
Gly His His Leu Phe Asp Gly Asp Gly Met Ile His Ala Val Ser Ile	
145 150 155 160	
ggt ttt gat aac cag gtt agt tac agc tgc cgg tac act aaa aca aac	528
Gly Phe Asp Asn Gln Val Ser Tyr Ser Cys Arg Tyr Thr Lys Thr Asn	
165 170 175	
cgg ctt gtt caa gaa acc gcg ctt gga cga tcg gtt ttc cct aaa cca	576
Arg Leu Val Gln Glu Thr Ala Leu Gly Arg Ser Val Phe Pro Lys Pro	
180 185 190	
atc ggc gag ctt cac ggc cat tcc ggt cta gct cga ctc gct ctc ttc	624
Ile Gly Glu Leu His Gly His Ser Gly Leu Ala Arg Leu Ala Leu Phe	
195 200 205	
acg gct cga gct ggg atc ggt cta gtg gac ggg aca cgt ggc atg ggc	672
Thr Ala Arg Ala Gly Ile Gly Leu Val Asp Gly Thr Arg Gly Met Gly	
210 215 220	
gta gct aac gcc ggt gtg gtt ttc ttt aac ggc agg tta tta gcc atg	720
Val Ala Asn Ala Gly Val Val Phe Phe Asn Gly Arg Leu Leu Ala Met	
225 230 235 240	

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Val	Ile	Ala	His	Pro	Lys	Val	Asp	Ala	Thr	Thr	Gly	Asp	Leu	His	Thr
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Leu	Ser	Tyr	Asn	Val	Leu	Lys	Lys	Pro	His	Leu	Arg	Tyr	Leu	Lys	Phe
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Ser	Lys	Gln	Asp	Leu	Thr	Gly	Ser	Asp	Ile	Asn	Trp	Val	Asp	Val	Pro
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Asp	Cys	Phe	Cys	Phe	His	Leu	Trp	Asn	Ala	Trp	Glu	Glu	Arg	Thr	Glu
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cgg	ctc	ctc	ctc	ttc	tac	gcg	cgc	ggt	ctc	ttc	ggg	ctc	gtt	gat	ggg	768
Arg	Leu	Leu	Leu	Phe	Tyr	Ala	Arg	Gly	Leu	Phe	Gly	Leu	Val	Asp	Gly	
				245					250					255		
tcc	cag	ggc	atg	ggc	gtg	gcg	aac	gcc	ggt	ctc	gtc	tac	ttc	aac	aac	816
Ser	Gln	Gly	Met	Gly	Val	Ala	Asn	Ala	Gly	Leu	Val	Tyr	Phe	Asn	Asn	
			260					265					270			
cac	ctc	ttg	gcc	atg	tcc	gaa	gac	gat	tta	ccc	tac	cac	gtg	aga	atc	864
His	Leu	Leu	Ala	Met	Ser	Glu	Asp	Asp	Leu	Pro	Tyr	His	Val	Arg	Ile	
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cag ctc aac tca aca atg atc gcc cac ccg aaa ctg gac ccc gtc gac	960
Gln Leu Asn Ser Thr Met Ile Ala His Pro Lys Leu Asp Pro Val Asp	
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Gly Asp Leu His Ala Leu Ser Tyr Asp Val Ile Gln Lys Pro Tyr Leu	
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Lys Tyr Phe Arg Phe Ser Pro Asp Gly Val Lys Ser Pro Asp Val Glu	
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atc ccc ctg aag gag ccc acc atg atg cac gat ttc gcc ata acg gag	1104
Ile Pro Leu Lys Glu Pro Thr Met Met His Asp Phe Ala Ile Thr Glu	
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Asn Phe Val Val Val Pro Asp Gln Gln Val Val Phe Lys Leu Thr Glu	
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Met Ile Thr Gly Gly Ser Pro Val Val Tyr Asp Lys Asn Lys Thr Ser	
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Arg Phe Gly Ile Leu His Lys Asn Ala Lys Asp Ala Asn Ala Met Arg	
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Trp Ile Asp Ala Pro Asp Cys Phe Cys Phe His Leu Trp Asn Ala Trp	
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Glu Glu Pro Glu Thr Glu Glu Val Val Val Ile Gly Ser Cys Met Thr	
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Pro Ala Asp Ser Ile Phe Asn Glu Cys Glu Glu Ser Leu Lys Ser Val	
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Leu Ser Glu Ile Arg Leu Asn Leu Arg Thr Gly Lys Ser Thr Arg Arg	
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Pro Ile Ile Ser Asp Ala Glu Gln Val Asn Leu Glu Ala Gly Met Val	
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Asn Arg Asn Lys Leu Gly Arg Lys Thr Gln Phe Ala Tyr Leu Ala Leu	
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 Ser Gly Glu Val Lys Lys Tyr Met Tyr Gly Glu Glu Lys Phe Gly Gly  
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 Glu Pro Leu Phe Leu Pro Asn Gly Gln Lys Glu Asp Asp Gly Tyr Ile  
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 Leu Ala Phe Val His Asp Glu Lys Glu Trp Lys Ser Glu Leu Gln Ile  
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 Val Asn Ala Gln Asn Leu Lys Leu Glu Ala Ser Ile Lys Leu Pro Ser  
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cgt gtt ccc tac ggt ttt cat gga act ttc att cat tcc aag gat ttg 1824  
 Arg Val Pro Tyr Gly Phe His Gly Thr Phe Ile His Ser Lys Asp Leu  
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Pro Leu Arg Lys Thr Ser Ser Ser Asn Thr Ile Thr Cys Ser Leu Gln  
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Thr Ala Thr Thr Thr Thr Pro Thr Pro Ile Lys Thr Thr Thr Ile Thr  
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Thr Thr Thr Pro Pro Arg Glu Thr Asn Pro Leu Ser Asp Thr Asn Gln  
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Pro Leu Pro Gln Lys Trp Asn Phe Leu Gln Lys Ala Ala Ala Thr Ala  
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Leu Asp Leu Val Glu Thr Ala Leu Val Ser His Glu Arg Lys His Pro  
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60750329-03294

1. *Phragmites australis* (Cav.) Trin. ex Steud.  
 2. *Scirpus americanus* L.  
 3. *Spartina patens* (Muhl.) B. & P.  
 4. *Spartina patens* (Muhl.) B. & P.  
 5. *Spartina patens* (Muhl.) B. & P.  
 6. *Spartina patens* (Muhl.) B. & P.  
 7. *Spartina patens* (Muhl.) B. & P.  
 8. *Spartina patens* (Muhl.) B. & P.  
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 10. *Spartina patens* (Muhl.) B. & P.

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Pro	Ala	Arg	Ser	Arg	Ala	Arg	Ala	Ser	Asn	Ser	Val	Arg	Phe	Ser	Pro	
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cgc	gcc	gtc	agc	tcc	gtg	ccg	ccc	gcc	gag	tgc	ctc	cag	gcg	ccg	ttc	144
Arg	Ala	Val	Ser	Ser	Val	Pro	Pro	Ala	Glu	Cys	Leu	Gln	Ala	Pro	Phe	
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cac His	aag Lys 50	ccc Pro	gtc Val	gcc Ala	gac Asp	ctg Leu 55	cct Pro	gcg Ala	ccg Pro	tcc Ser	agg Arg 60	aag Lys	ccc Pro	gcc Ala	gcc Ala	192
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gcg Ala	ttc Phe	gag Glu	gaa Glu 100	ggg Gly	ttc Phe	gtg Val	gcc Ala	aac Asn 105	gtc Val	ctc Leu	gag Glu	cgg Arg	ccc Pro 110	cac His	ggg Gly	336
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cgc Arg	ttc Phe	acg Thr 195	gag Glu	acc Thr	gcg Ala	cgc Arg	ctg Leu 200	cgc Arg	cag Gln	gag Glu	cgc Arg	gcg Ala 205	atc Ile	ggc Gly	cgc Arg	624
ccc Pro	gtc Val 210	ttc Phe	ccc Pro	aag Lys	gcc Ala	att Ile 215	ggc Gly	gag Glu	ctg Leu	cac His	ggg Gly 220	cac His	tcc Ser	ggg Gly	atc Ile	672
gcg Ala 225	cgc Arg	ctc Leu	gcc Ala	ctg Leu	ttc Phe 230	tac Tyr	gcg Ala	cgc Arg	gcc Ala	gcg Ala 235	tgc Cys	ggc Gly	ctc Leu	gtg Val	gac Asp 240	720
ccc Pro	tcg Ser	gcc Ala	ggc Gly	acc Thr 245	ggc Gly	gtg Val	gcc Ala	aac Asn	gcc Ala 250	ggc Gly	ctc Leu	gtc Val	tac Tyr	ttc Phe 255	aac Asn	768
ggc Gly	cgc Arg	ctg Leu	ctc Leu	gcc Ala 260	atg Met	tcc Ser	gag Glu	gac Asp 265	gac Asp	ctc Leu	ccc Pro	tac Tyr	cac His 270	gtc Val	cgc Arg	816

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Val	Ala	Asp	Asp	Gly	Asp	Leu	Glu	Thr	Val	Gly	Arg	Tyr	Asp	Phe	Asp	
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Gly	Gln	Leu	Gly	Cys	Ala	Met	Ile	Ala	His	Pro	Lys	Leu	Asp	Pro	Ala	
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Leu	Lys	Tyr	Phe	Tyr	Phe	Arg	Pro	Asp	Gly	Thr	Lys	Ser	Asp	Asp	Val	
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gag	atc	ccg	ctg	gag	cag	ccc	acg	atg	atc	cac	gac	ttc	gcc	atc	acc	1056
Glu	Ile	Pro	Leu	Glu	Gln	Pro	Thr	Met	Ile	His	Asp	Phe	Ala	Ile	Thr	
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Glu	Asn	Phe	Val	Val	Val	Pro	Asp	His	Gln	Val	Val	Phe	Lys	Leu	Gln	
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Glu	Met	Leu	Arg	Gly	Gly	Ser	Pro	Val	Val	Leu	Asp	Lys	Glu	Lys	Thr	
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Ser	Arg	Phe	Gly	Val	Leu	Pro	Lys	His	Ala	Ala	Asp	Ala	Ser	Glu	Met	
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Thr	Pro	Ala	Asp	Ser	Ile	Phe	Asn	Glu	Ser	Asp	Glu	Arg	Leu	Glu	Ser	
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gtg	ctg	acc	gag	atc	cgc	ctg	gac	gcg	cgc	acg	ggc	cgg	tcc	acg	cgc	1392
Val	Leu	Thr	Glu	Ile	Arg	Leu	Asp	Ala	Arg	Thr	Gly	Arg	Ser	Thr	Arg	
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cgc	gcc	gtc	ctg	ccg	ccg	tgc	cag	cag	gag	aac	ctg	gag	gtg	ggc	atg	1440
Arg	Ala	Val	Leu	Pro	Pro	Ser	Gln	Gln	Glu	Asn	Leu	Glu	Val	Gly	Met	
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Val	Asn	Arg	Asn	Leu	Leu	Gly	Arg	Glu	Ser	Arg	Tyr	Ala	Tyr	Leu	Ala	
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 Val Ala Glu Pro Trp Pro Lys Glu Ser Gly Phe Ala Lys Glu Asp Leu  
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tcc acg ggc gag ctc acc aag ttc gag tac ggc gag ggc cgg ttc ggc 1584  
 Ser Thr Gly Glu Leu Thr Lys Phe Glu Tyr Gly Glu Gly Arg Phe Gly  
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 Gly Glu Pro Cys Phe Val Pro Met Asp Pro Ala Ala Ala His Pro Arg  
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gcc acg gtt cag ctg ccg tcc cgc gtg ccc ttc ggc ttc cac ggc acc 1776  
 Ala Thr Val Gln Leu Pro Ser Arg Val Pro Phe Gly Phe His Gly Thr  
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Arg Ala Val Ser Ser Val Pro Pro Ala Glu Cys Leu Gln Ala Pro Phe  
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His Lys Pro Val Ala Asp Leu Pro Ala Pro Ser Arg Lys Pro Ala Ala  
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Ile Ala Val Pro Gly His Ala Ala Ala Pro Arg Lys Ala Glu Gly Gly  
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Lys Lys Gln Leu Asn Leu Phe Gln Arg Ala Ala Ala Ala Ala Leu Asp  
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Ala Phe Glu Glu Gly Phe Val Ala Asn Val Leu Glu Arg Pro His Gly  
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Leu Pro Ser Thr Ala Asp Pro Ala Val Gln Ile Ala Gly Asn Phe Ala  
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Cys	Phe	Asp	Pro	Val	Ala	Gly	His	His	Leu	Phe	Asp	Gly	Asp	Gly	Met
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Val	His	Ala	Leu	Arg	Ile	Arg	Asn	Gly	Ala	Ala	Glu	Ser	Tyr	Ala	Cys
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Arg	Phe	Thr	Glu	Thr	Ala	Arg	Leu	Arg	Gln	Glu	Arg	Ala	Ile	Gly	Arg
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Glu	Ile	Pro	Leu	Glu	Gln	Pro	Thr	Met	Ile	His	Asp	Phe	Ala	Ile	Thr
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Ala	Trp	Val	Asp	Val	Pro	Asp	Cys	Phe	Cys	Phe	His	Leu	Trp	Asn	Ala
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Trp	Glu	Asp	Glu	Ala	Thr	Gly	Glu	Val	Val	Val	Ile	Gly	Ser	Cys	Met
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Thr Pro Ala Asp Ser Ile Phe Asn Glu Ser Asp Glu Arg Leu Glu Ser  
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 Val Leu Thr Glu Ile Arg Leu Asp Ala Arg Thr Gly Arg Ser Thr Arg  
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 Val Ala Glu Pro Trp Pro Lys Glu Ser Gly Phe Ala Lys Glu Asp Leu  
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Tyr	Gln	Thr	Pro	Lys	Asn	Asn	Thr	Ile	Ser	His	Pro	Lys	Gln	Glu	Asn	
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Asn	Asn	Ser	Ser	Ser	Ser	Ser	Thr	Ser	Lys	Trp	Asn	Leu	Val	Gln	Lys	
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gca	gca	gca	atg	gct	tta	gat	gct	gta	gaa	agt	gct	tta	act	aaa	cat	336
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Pro	Val	Thr	Gly	Lys	Ile	Pro	Lys	Cys	Val	Gln	Gly	Val	Tyr	Val	Arg	
	145				150					155					160	
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Asn	Gly	Ala	Asn	Pro	Leu	Phe	Glu	Pro	Thr	Ala	Gly	His	His	Phe	Phe	
				165					170					175		
gac	ggc	gac	ggt	atg	gtt	cac	gcc	gtt	caa	ttc	aaa	aat	ggg	tcg	gct	576
Asp	Gly	Asp	Gly	Met	Val	His	Ala	Val	Gln	Phe	Lys	Asn	Gly	Ser	Ala	
			180					185						190		
agt	tac	gct	tgc	cgt	ttc	act	gaa	aca	gag	agg	ctt	gtt	caa	gaa	aaa	624
Ser	Tyr	Ala	Cys	Arg	Phe	Thr	Glu	Thr	Glu	Arg	Leu	Val	Gln	Glu	Lys	
		195					200					205				
gct	ttg	ggt	cgc	cct	gtt	ttc	cct	aaa	gcc	att	ggt	gaa	tta	cat	ggt	672
Ala	Leu	Gly	Arg	Pro	Val	Phe	Pro	Lys	Ala	Ile	Gly	Glu	Leu	His	Gly	
	210					215					220					
cac	tct	gga	att	gca	agg	ctt	atg	ctg	ttt	tac	gct	cgt	ggg	ctc	ttc	720
His	Ser	Gly	Ile	Ala	Arg	Leu	Met	Leu	Phe	Tyr	Ala	Arg	Gly	Leu	Phe	
	225				230					235					240	
gga	ctt	gtt	gat	cac	agt	aaa	gga	act	ggt	gtt	gca	aac	gcc	ggt	tta	768
Gly	Leu	Val	Asp	His	Ser	Lys	Gly	Thr	Gly	Val	Ala	Asn	Ala	Gly	Leu	
				245					250					255		
gtc	tat	ttc	aat	aac	cga	tta	ctt	gct	atg	tct	gaa	gat	gat	ttg	cct	816
Val	Tyr	Phe	Asn	Asn	Arg	Leu	Leu	Ala	Met	Ser	Glu	Asp	Asp	Leu	Pro	
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Tyr His Val Lys Val Thr Pro Thr Gly Asp Leu Lys Thr Glu Gly Arg	
275 280 285	
ttc gat ttc gac ggc cag cta aaa tcc acc atg ata gct cac cca aag	912
Phe Asp Phe Asp Gly Gln Leu Lys Ser Thr Met Ile Ala His Pro Lys	
290 295 300	
ctc gac cca gtt tcc ggt gag cta ttt gct ctt agc tac gat gtg att	960
Leu Asp Pro Val Ser Gly Glu Leu Phe Ala Leu Ser Tyr Asp Val Ile	
305 310 315 320	
cag aag cca tac ctc aag tac ttc aga ttt tca aaa aat ggg gaa aaa	1008
Gln Lys Pro Tyr Leu Lys Tyr Phe Arg Phe Ser Lys Asn Gly Glu Lys	
325 330 335	
tca aat gat gtt gaa att cca gtt gaa gac cca aca atg atg cat gat	1056
Ser Asn Asp Val Glu Ile Pro Val Glu Asp Pro Thr Met Met His Asp	
340 345 350	
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Phe Ala Ile Thr Glu Asn Phe Val Val Ile Pro Asp Gln Gln Val Val	
355 360 365	
ttc aag atg tct gaa atg atc cgt gga ggt tca ccg gtg gtt tac gac	1152
Phe Lys Met Ser Glu Met Ile Arg Gly Gly Ser Pro Val Val Tyr Asp	
370 375 380	
aag aac aaa gtt tcc cga ttt ggt att ctg gat aag tac gcg aaa gat	1200
Lys Asn Lys Val Ser Arg Phe Gly Ile Leu Asp Lys Tyr Ala Lys Asp	
385 390 395 400	
ggg tct gat ttg aaa tgg gtt gaa gta cct gat tgt ttc tgt ttc cac	1248
Gly Ser Asp Leu Lys Trp Val Glu Val Pro Asp Cys Phe Cys Phe His	
405 410 415	
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Leu Trp Asn Ala Trp Glu Glu Ala Glu Thr Asp Glu Ile Val Val Ile	
420 425 430	
ggg tca tgt atg aca cca cca gac tcc att ttc aat gaa tgt gat gaa	1344
Gly Ser Cys Met Thr Pro Pro Asp Ser Ile Phe Asn Glu Cys Asp Glu	
435 440 445	
ggg cta aag agt gtt tta tcc gaa atc cgt ctc aat ttg aaa aca ggg	1392
Gly Leu Lys Ser Val Leu Ser Glu Ile Arg Leu Asn Leu Lys Thr Gly	
450 455 460	
aaa tca aca aga aaa tcc ata atc gaa aac ccg gat gaa caa gtg aat	1440
Lys Ser Thr Arg Lys Ser Ile Ile Glu Asn Pro Asp Glu Gln Val Asn	
465 470 475 480	
tta gaa gct gga atg gtg aac cga aac aaa ctc gga agg aaa aca gag	1488
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Ser	Leu	Leu	Lys	Asn	Gln	His	Asn	Arg	Gln	Ser	Leu	Asn	Ile	Asn	Ser
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Ser	Leu	Gln	Ala	Pro	Pro	Ile	Leu	His	Phe	Pro	Lys	Gln	Ser	Ser	Asn
	50					55					60				
Tyr	Gln	Thr	Pro	Lys	Asn	Asn	Thr	Ile	Ser	His	Pro	Lys	Gln	Glu	Asn
65					70					75					80
Asn	Asn	Ser	Ser	Ser	Ser	Ser	Thr	Ser	Lys	Trp	Asn	Leu	Val	Gln	Lys
				85					90					95	
Ala	Ala	Ala	Met	Ala	Leu	Asp	Ala	Val	Glu	Ser	Ala	Leu	Thr	Lys	His
			100					105					110		
Glu	Leu	Glu	His	Pro	Leu	Pro	Lys	Thr	Ala	Asp	Pro	Arg	Val	Gln	Ile
		115					120					125			

Ser Gly Asn Phe Ala Pro Val Pro Glu Asn Pro Val Cys Gln Ser Leu  
 130 135 140  
 Pro Val Thr Gly Lys Ile Pro Lys Cys Val Gln Gly Val Tyr Val Arg  
 145 150 155 160  
 Asn Gly Ala Asn Pro Leu Phe Glu Pro Thr Ala Gly His His Phe Phe  
 165 170 175  
 Asp Gly Asp Gly Met Val His Ala Val Gln Phe Lys Asn Gly Ser Ala  
 180 185 190  
 Ser Tyr Ala Cys Arg Phe Thr Glu Thr Glu Arg Leu Val Gln Glu Lys  
 195 200 205  
 Ala Leu Gly Arg Pro Val Phe Pro Lys Ala Ile Gly Glu Leu His Gly  
 210 215 220  
 His Ser Gly Ile Ala Arg Leu Met Leu Phe Tyr Ala Arg Gly Leu Phe  
 225 230 235 240  
 Gly Leu Val Asp His Ser Lys Gly Thr Gly Val Ala Asn Ala Gly Leu  
 245 250 255  
 Val Tyr Phe Asn Asn Arg Leu Leu Ala Met Ser Glu Asp Asp Leu Pro  
 260 265 270  
 Tyr His Val Lys Val Thr Pro Thr Gly Asp Leu Lys Thr Glu Gly Arg  
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 Phe Asp Phe Asp Gly Gln Leu Lys Ser Thr Met Ile Ala His Pro Lys  
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 Leu Asp Pro Val Ser Gly Glu Leu Phe Ala Leu Ser Tyr Asp Val Ile  
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 Gln Lys Pro Tyr Leu Lys Tyr Phe Arg Phe Ser Lys Asn Gly Glu Lys  
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 Phe Lys Met Ser Glu Met Ile Arg Gly Gly Ser Pro Val Val Tyr Asp  
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 Lys Asn Lys Val Ser Arg Phe Gly Ile Leu Asp Lys Tyr Ala Lys Asp  
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 Gly Ser Asp Leu Lys Trp Val Glu Val Pro Asp Cys Phe Cys Phe His  
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Ser	Gly	Asn	Phe	Ala	Pro	Ile	Arg	Asp	Glu	Thr	Pro	Pro	Val	Lys	Asp	
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Arg	Val	Gly	Pro	Asn	Pro	Lys	Phe	Asp	Ala	Val	Ala	Gly	Tyr	His	Trp	
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Phe	Asp	Gly	Asp	Gly	Met	Ile	His	Gly	Val	Arg	Ile	Lys	Asp	Gly	Lys	
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Ala	Thr	Tyr	Val	Ser	Arg	Tyr	Val	Lys	Thr	Ser	Arg	Leu	Lys	Gln	Glu	
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Glu	Phe	Phe	Gly	Ala	Ala	Lys	Phe	Met	Lys	Ile	Gly	Asp	Leu	Lys	Gly	
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Phe	Phe	Gly	Leu	Leu	Met	Val	Asn	Ile	Gln	Gln	Leu	Arg	Thr	Lys	Leu	
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aaa	ata	ttg	gac	aac	act	tat	gga	aat	gga	act	gcc	aat	aca	gca	ctc	528
Lys	Ile	Leu	Asp	Asn	Thr	Tyr	Gly	Asn	Gly	Thr	Ala	Asn	Thr	Ala	Leu	
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gta	tat	cac	cat	gga	aaa	ctt	cta	gca	tta	cag	gag	gca	gat	aag	ccg	576
Val	Tyr	His	His	Gly	Lys	Leu	Leu	Ala	Leu	Gln	Glu	Ala	Asp	Lys	Pro	
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Tyr	Val	Ile	Lys	Val	Leu	Glu	Asp	Gly	Asp	Leu	Gln	Thr	Leu	Gly	Ile	
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Ile	Asp	Tyr	Asp	Lys	Arg	Leu	Thr	His	Ser	Phe	Thr	Ala	His	Pro	Lys	
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gtt	gac	ccg	gtt	acg	ggt	gaa	atg	ttt	aca	ttc	ggc	tat	tcg	cat	acg	720
Val	Asp	Pro	Val	Thr	Gly	Glu	Met	Phe	Thr	Phe	Gly	Tyr	Ser	His	Thr	
225230235																
cca	cct	tat	ctc	aca	tac	aga	gtt	atc	tcg	aaa	gat	ggc	att	atg	cat	768
Pro	Pro	Tyr	Leu	Thr	Tyr	Arg	Val	Ile	Ser	Lys	Asp	Gly	Ile	Met	His	
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gac	cca	gtc	cca	att	act	ata	tca	gag	cct	atc	atg	atg	cat	gat	ttt	816
Asp	Pro	Val	Pro	Ile	Thr	Ile	Ser	Glu	Pro	Ile	Met	Met	His	Asp	Phe	
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Ala Ile Thr Glu Thr Tyr Ala Ile Phe Met Asp Leu Pro Met His Phe	
275 280 285	
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Arg Pro Lys Glu Met Val Lys Glu Lys Lys Met Ile Tyr Ser Phe Asp	
290 295 300	
ccc aca aaa aag gct cgt ttt ggt gtt ctt ccg cgc tat gcc aag gat	960
Pro Thr Lys Lys Ala Arg Phe Gly Val Leu Pro Arg Tyr Ala Lys Asp	
305 310 315 320	
gaa ctt atg att aga tgg ttt gag ctt ccc aac tgc ttt att ttc cac	1008
Glu Leu Met Ile Arg Trp Phe Glu Leu Pro Asn Cys Phe Ile Phe His	
325 330 335	
aac gcc aat gct tgg gaa gaa gag gat gaa gtc gtc ctc atc act tgt	1056
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cgt ctt gag aat cca gat ctt gac atg gtc agt ggg aaa gtg aaa gaa	1104
Arg Leu Glu Asn Pro Asp Leu Asp Met Val Ser Gly Lys Val Lys Glu	
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Lys Leu Glu Asn Phe Gly Asn Glu Leu Tyr Glu Met Arg Phe Asn Met	
370 375 380	
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Lys Thr Gly Ser Ala Ser Gln Lys Lys Leu Ser Ala Ser Ala Val Asp	
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Phe Pro Arg Ile Asn Glu Cys Tyr Thr Gly Lys Lys Gln Arg Tyr Val	
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Tyr Gly Thr Ile Leu Asp Ser Ile Ala Lys Val Thr Gly Ile Ile Lys	
420 425 430	
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Phe Asp Leu His Ala Glu Ala Glu Thr Gly Lys Arg Met Leu Glu Val	
435 440 445	
gga ggt aat atc aaa gga ata tat gac ctg gga gaa ggc aga tat ggt	1392
Gly Gly Asn Ile Lys Gly Ile Tyr Asp Leu Gly Glu Gly Arg Tyr Gly	
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Ser Glu Ala Ile Tyr Val Pro Arg Glu Thr Ala Glu Glu Asp Asp Gly	
465 470 475 480	
tac ttg ata ttc ttt gtt cat gat gaa aac aca ggg aaa tca tgc gtg	1488
Tyr Leu Ile Phe Phe Val His Asp Glu Asn Thr Gly Lys Ser Cys Val	
485 490 495	

69230450

act gtg ata gac gca aaa aca atg tcg gct gaa ccg gtg gca gtg gtg 1536  
 Thr Val Ile Asp Ala Lys Thr Met Ser Ala Glu Pro Val Ala Val Val  
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gag ctg ccg cac agg gtc cca tat ggc ttc cat gcc ttg ttt gtt aca 1584  
 Glu Leu Pro His Arg Val Pro Tyr Gly Phe His Ala Leu Phe Val Thr  
                   515                                  520                                  525

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                   20                                  25                                  30

Leu Val Val Lys Leu Met His Asp Ala Ser Leu Pro Leu His Tyr Leu  
                   35                                  40                                  45

Ser Gly Asn Phe Ala Pro Ile Arg Asp Glu Thr Pro Pro Val Lys Asp  
                   50                                  55                                  60

Leu Pro Val His Gly Phe Leu Pro Glu Cys Leu Asn Gly Glu Phe Val  
                   65                                  70                                  75                                  80

Arg Val Gly Pro Asn Pro Lys Phe Asp Ala Val Ala Gly Tyr His Trp  
                                   85                                  90                                  95

Phe Asp Gly Asp Gly Met Ile His Gly Val Arg Ile Lys Asp Gly Lys  
                   100                                  105                                  110

Ala Thr Tyr Val Ser Arg Tyr Val Lys Thr Ser Arg Leu Lys Gln Glu  
                   115                                  120                                  125

Glu Phe Phe Gly Ala Ala Lys Phe Met Lys Ile Gly Asp Leu Lys Gly  
                   130                                  135                                  140

Phe Phe Gly Leu Leu Met Val Asn Ile Gln Gln Leu Arg Thr Lys Leu  
                   145                                  150                                  155                                  160

Lys Ile Leu Asp Asn Thr Tyr Gly Asn Gly Thr Ala Asn Thr Ala Leu  
                                   165                                  170                                  175

Val Tyr His His Gly Lys Leu Leu Ala Leu Gln Glu Ala Asp Lys Pro  
                   180                                  185                                  190

Tyr Val Ile Lys Val Leu Glu Asp Gly Asp Leu Gln Thr Leu Gly Ile  
                   195                                  200                                  205

500 505 510 515 520 525 530 535

Ile	Asp	Tyr	Asp	Lys	Arg	Leu	Thr	His	Ser	Phe	Thr	Ala	His	Pro	Lys
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225					230					235					240
Pro	Pro	Tyr	Leu	Thr	Tyr	Arg	Val	Ile	Ser	Lys	Asp	Gly	Ile	Met	His
				245					250					255	
Asp	Pro	Val	Pro	Ile	Thr	Ile	Ser	Glu	Pro	Ile	Met	Met	His	Asp	Phe
			260					265					270		
Ala	Ile	Thr	Glu	Thr	Tyr	Ala	Ile	Phe	Met	Asp	Leu	Pro	Met	His	Phe
		275					280					285			
Arg	Pro	Lys	Glu	Met	Val	Lys	Glu	Lys	Lys	Met	Ile	Tyr	Ser	Phe	Asp
	290					295					300				
Pro	Thr	Lys	Lys	Ala	Arg	Phe	Gly	Val	Leu	Pro	Arg	Tyr	Ala	Lys	Asp
305					310					315					320
Glu	Leu	Met	Ile	Arg	Trp	Phe	Glu	Leu	Pro	Asn	Cys	Phe	Ile	Phe	His
				325					330					335	
Asn	Ala	Asn	Ala	Trp	Glu	Glu	Glu	Asp	Glu	Val	Val	Leu	Ile	Thr	Cys
			340					345					350		
Arg	Leu	Glu	Asn	Pro	Asp	Leu	Asp	Met	Val	Ser	Gly	Lys	Val	Lys	Glu
		355					360					365			
Lys	Leu	Glu	Asn	Phe	Gly	Asn	Glu	Leu	Tyr	Glu	Met	Arg	Phe	Asn	Met
	370					375					380				
Lys	Thr	Gly	Ser	Ala	Ser	Gln	Lys	Lys	Leu	Ser	Ala	Ser	Ala	Val	Asp
385					390					395					400
Phe	Pro	Arg	Ile	Asn	Glu	Cys	Tyr	Thr	Gly	Lys	Lys	Gln	Arg	Tyr	Val
				405					410					415	
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			420					425					430		
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		435					440					445			
Gly	Gly	Asn	Ile	Lys	Gly	Ile	Tyr	Asp	Leu	Gly	Glu	Gly	Arg	Tyr	Gly
	450					455					460				
Ser	Glu	Ala	Ile	Tyr	Val	Pro	Arg	Glu	Thr	Ala	Glu	Glu	Asp	Asp	Gly
465					470					475					480
Tyr	Leu	Ile	Phe	Phe	Val	His	Asp	Glu	Asn	Thr	Gly	Lys	Ser	Cys	Val
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Thr	Val	Ile	Asp	Ala	Lys	Thr	Met	Ser	Ala	Glu	Pro	Val	Ala	Val	Val
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<210> 24

<211> 31

<212> DNA

<213> Artificial Sequence

**<220>**

<223> Description of Artificial Sequence: Primer

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<212> DNA

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<220>

<223> Description of Artificial Sequence: Primer

<400> 25

33

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<212> DNA

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<223> Description of Artificial Sequence: Primer

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<210> 33  
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<400> 33

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Leu	Val	Val	Lys	Leu	Met	His	Asp	Ala	Ser	Leu	Pro	Leu	His	Tyr	Leu	35	40	45	
Ser	Gly	Asn	Phe	Ala	Pro	Ile	Arg	Asp	Glu	Thr	Pro	Pro	Val	Lys	Asp	50	55	60	
Leu	Pro	Val	His	Gly	Phe	Leu	Pro	Glu	Cys	Leu	Asn	Gly	Glu	Phe	Val	65	70	75	80
Arg	Val	Gly	Pro	Asn	Pro	Lys	Phe	Asp	Ala	Val	Ala	Gly	Tyr	His	Trp	85	90	95	
Phe	Asp	Gly	Asp	Gly	Met	Ile	His	Gly	Val	Arg	Ile	Lys	Asp	Gly	Lys	100	105	110	
Ala	Thr	Tyr	Val	Ser	Arg	Tyr	Val	Lys	Thr	Ser	Arg	Leu	Lys	Gln	Glu	115	120	125	
Glu	Phe	Phe	Gly	Ala	Ala	Lys	Phe	Met	Lys	Ile	Gly	Asp	Leu	Lys	Gly	130	135	140	
Phe	Phe	Gly	Leu	Leu	Met	Val	Asn	Val	Gln	Gln	Leu	Arg	Thr	Lys	Leu	145	150	155	160
Lys	Ile	Leu	Asp	Asn	Thr	Tyr	Gly	Asn	Gly	Thr	Ala	Asn	Thr	Ala	Leu	165	170	175	
Val	Tyr	His	His	Gly	Lys	Leu	Leu	Ala	Leu	Gln	Glu	Ala	Asp	Lys	Pro	180	185	190	
Tyr	Val	Ile	Lys	Val	Leu	Glu	Asp	Gly	Asp	Leu	Gln	Thr	Leu	Gly	Ile	195	200	205	
Ile	Asp	Tyr	Asp	Lys	Arg	Leu	Thr	His	Ser	Phe	Thr	Ala	His	Pro	Lys	210	215	220	
Val	Asp	Pro	Val	Thr	Gly	Glu	Met	Phe	Thr	Phe	Gly	Tyr	Ser	His	Thr	225	230	235	240
Pro	Pro	Tyr	Leu	Thr	Tyr	Arg	Val	Ile	Ser	Lys	Asp	Gly	Ile	Met	His	245	250	255	
Asp	Pro	Val	Pro	Ile	Thr	Ile	Ser	Glu	Pro	Ile	Met	Met	His	Asp	Phe	260	265	270	



Ala	Ile	Thr	Glu	Thr	Tyr	Ala	Ile	Phe	Met	Asp	Leu	Pro	Met	His	Phe
275						280						285			
Arg	Pro	Lys	Glu	Met	Val	Lys	Glu	Lys	Lys	Met	Ile	Tyr	Ser	Phe	Asp
290						295				300					
Pro	Thr	Lys	Lys	Ala	Arg	Phe	Gly	Val	Leu	Pro	Arg	Tyr	Ala	Lys	Asp
305				310						315				320	
Glu	Leu	Met	Ile	Arg	Trp	Phe	Glu	Leu	Pro	Asn	Cys	Phe	Ile	Phe	His
				325				330						335	
Asn	Ala	Asn	Ala	Trp	Glu	Glu	Glu	Asp	Glu	Val	Val	Leu	Ile	Thr	Cys
		340						345				350			
Arg	Leu	Glu	Asn	Pro	Asp	Leu	Asp	Met	Val	Ser	Gly	Lys	Val	Lys	Glu
		355				360						365			
Lys	Leu	Glu	Asn	Phe	Gly	Asn	Glu	Leu	Tyr	Glu	Met	Arg	Phe	Asn	Met
370						375				380					
Lys	Thr	Gly	Ser	Ala	Ser	Gln	Lys	Lys	Leu	Ser	Ala	Ser	Ala	Val	Asp
385				390						395				400	
Phe	Pro	Arg	Ile	Asn	Glu	Cys	Tyr	Thr	Gly	Lys	Lys	Gln	Arg	Tyr	Val
				405				410						415	
Tyr	Gly	Thr	Ile	Leu	Asp	Ser	Ile	Ala	Lys	Val	Thr	Gly	Ile	Ile	Lys
		420						425				430			
Phe	Asp	Leu	His	Ala	Glu	Ala	Glu	Thr	Gly	Lys	Arg	Met	Leu	Glu	Val
		435				440						445			
Gly	Gly	Asn	Ile	Lys	Gly	Ile	Tyr	Asp	Leu	Gly	Glu	Gly	Arg	Tyr	Gly
450						455				460					
Ser	Glu	Ala	Ile	Tyr	Val	Pro	Arg	Glu	Thr	Ala	Glu	Glu	Asp	Asp	Gly
465				470						475				480	
Tyr	Leu	Ile	Phe	Phe	Val	His	Asp	Glu	Asn	Thr	Gly	Lys	Ser	Cys	Val
				485				490						495	
Thr	Val	Ile	Asp	Ala	Lys	Thr	Met	Ser	Ala	Glu	Pro	Val	Ala	Val	Val
		500						505				510			
Glu	Leu	Pro	His	Arg	Val	Pro	Tyr	Gly	Phe	His	Ala	Leu	Phe	Val	Thr
		515				520						525			
Glu	Glu	Gln	Leu	Gln	Glu	Gln	Thr	Leu	Ile						
530						535									